


'diamond-dot'

CAR RADIO DIVISION, ELECTRONIC INDUSTRIES LTD.

ASTOR HOUSE: 161-173 STURT ST., SOUTH MELBOURNE - Phone: 69 0300

SERVICE DATA

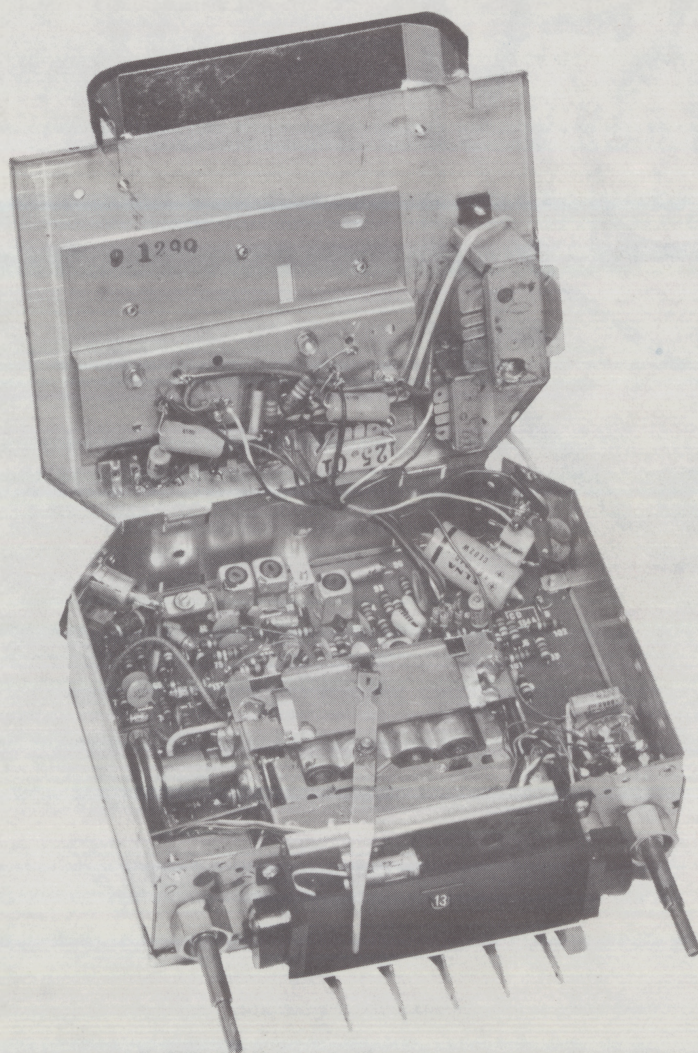
MODEL PN-C24P

PUSH BUTTON 13 TRANSISTOR

12 VOLT NEGATIVE TO CHASSIS CAR RADIO RECEIVER

Especially designed for Holden Model "HT"

WARNING: BATTERY CONNECTION OF INCORRECT POLARITY WILL DAMAGE THE RECEIVER. BATTERY LEAD OF THESE RECEIVERS MUST BE CONNECTED TO POSITIVE TERMINAL OF SUPPLY. CONNECT NEGATIVE SUPPLY LEAD TO RECEIVER CHASSIS.



ALIGNMENT PROCEDURE

EQUIPMENT

Signal Generator - modulated 400 Hz
Output Meter - 15 Ohms Impedance
Generator Series Capacitor - .1uF Part No. 4009-008-20 for I.F. alignment
I.F. Attenuator - Part No. 4121-014-01
Dummy Aerial - 65 pF Part No. 4121-009-01
Alignment Tools:

- (a) Flat Metal Blade Type; Part No. 4121-001-01 for I.F.T. and Osc. shunt coil adjustment.
- (b) Chisel Point Type: Part No. 4121-005-01, for trimmer capacitor adjustment.
- (c) Tuning Unit Iron Core Adjustor: Part No. 4121-008-01
- (d) Alignment Gauge: Part No. 4121-022-02 for tuner 1000 KHz position.
- (e) Clutch Release Bracket: Part No. 4121-029-01, manual model only.

CONDITIONS

Remove screws and hinge top lid upward.
Volume control - maximum, clockwise.
Tone Control - maximum, clockwise.
Noise Suppression Switch - "OFF" clockwise
Output Meter Connection - Socket, adjacent to battery lead entry.
Output Level - 50 Milliwatts, speaker disconnected.
Supply voltage - 12.0V DC.
Supply Connection - Connect positive supply lead to receiver lead. Connect negative supply lead to receiver chassis.

INTERMEDIATE FREQUENCY TRANSFORMER ALIGNMENT

Turn tuning control until cores of tuner unit are out of coil windings. Insert .1uF capacitor in series with generator "hot" lead.

| Oper. No. | Generator Connection | Generator Frequency | Instructions |
|-----------|---|---------------------|---|
| 1 | To test pin "A" (base of Mixer stage) and return lead to test pin "C" (negative line) | 455 KHz | Adjust iron core of 4th IF trans. for maximum output. |
| 2 | As oper. 1 | 455 KHz | Adjust iron core of 3rd IF trans. for maximum output. |
| 3 | As oper. 1 | 455 KHz | Adjust iron core of 2nd IF trans. for maximum output. |
| 4 | As oper. 1 | 455 KHz | Adjust iron core of 1st IF trans. for maximum output. |
| 5 | Repeat operations No. 3 and 4 until maximum output is obtained. | | |

BROADCAST ALIGNMENT

If the receiver logging is satisfactory the signal circuits may be aligned as detailed.

- 1 Connect IF. attenuator to test pins "B" and "C" (resistor to pin "C")
- 2 Aerial Lead-in Socket -65 pF dummy in series 1000 KHz Tune receiver to generator frequency. Adjust RF and both aerial trimmer capacitors for maximum output.

AERIAL TRIMMER ADJUSTMENT

IMPORTANT

When the receiver has been installed in the vehicle and the aerial connected the aerial trimmer must be readjusted. Raise the aerial to half extended height. Adjust knob on passenger side of receiver for maximum output on a weak station near 1000 KHz (approx. centre of dial) NOTE: If a fully retractable aerial is fitted pull the large outer rod upward against stop in aerial base.

MECHANICAL

| Part Number | Description |
|-------------|--|
| 7111-036-01 | Heat Sink (1) power transistors |
| 7111-007-01 | Heat Sink (1) temp. comp. transistor |
| | Power transistor mounting hardware |
| | consists of : |
| 7120-049-01 | Gasket (2) mica |
| 7031-036-01 | Bush (4) moulded |
| 7198-076-12 | Screw (4) 3/8" x 1/8" Whit. cheese head |
| 7262-008-02 | Washer (4) 1/8" internal shakeproof |
| 7148-302-11 | Nut (4) 1/8" Whit. hex. |
| 7138-070-22 | Solder lug (2) |
| 7120-026-01 | Insulator (22) glass - transistor, diode and capacitor mount |
| 7167-058-01 | Pin (9) circuit board terminations |
| 7060-022-02 | Contact (4) circuit board links |
| 7215-095-01 | Shield (1) tuner terminals |
| 7027-571-01 | Shield (1) leads - top front of tuner |
| 7055-412-01 | Contact (4) tuner frame to can |
| 7185-021-02 | Retainer (1) battery lead entry |
| 7031-009-01 | Bush (1) lead retainer |
| 7222-115-01 | Socket body (3) dial lamp |
| 7086-095-02 | Contact eyelet (3) lamp socket |
| 7031-146-02 | Bush (2) dial lamp socket |
| 7055-532-01 | Clip (1) lamp socket |
| 7150-901-03 | Spacer nut (2) control bushes |
| 7201-533-11 | Screw (15) 1/4" x No. 6 Phillips csk.hd. - various |
| 7204-576-15 | Screw (15) 1/4" x No. 4 Phillips pan hd. - various |
| 7224-377-04 | Spindles and bush assy. (1) complete, includes tuning and switch spindles, pinion shaft and yoke assy., trunnion, mount bush and circlip |
| 7224-378-01 | Pinion shaft and yoke assy. (1) |
| 7407-001-01 | Trunnion (1) |
| 7031-066-01 | Bush (1) |
| 7055-366-05 | Circlip (1) |
| 4077-238-03 | Battery lead assy. (1) |
| | Consists of : |
| 7244-003-01 | Terminal (1) on end of lead |
| 7291-003-01 | Shroud (1) terminal |
| 1169-051-04 | Lead - yellow - 24 inches required |
| 7091-017-11 | Light filter (1) blue - right hand |
| 7091-017-51 | Light filter (1) blue - left hand |
| 7005-064-06 | Dial background assy. (1) push button |
| 7204-576-15 | Screw (4) 1/4" x No. 4 Phillips Hd. - light filters and dial background |
| 7173-056-03 | Pointer (1) |
| 7124-285-03 | Knob (1) aerial trimmer |
| 7124-366-01 | Knob (5) push button |
| 7124-453-01 | Knob (2) tuning and volume front |
| 7124-356-01 | Knob (2) noise suppression and tone rear |
| 7169-677-02 | Dust shield (1) |
| 7070-088-21 | Dial reading (1) all state |
| 7070-088-22 | Dial reading (1) N.S.W. |
| 7070-088-23 | Dial reading (1) Vic. |
| 7070-088-24 | Dial reading (1) Qld. and N.G. |
| 7070-088-25 | Dial reading (1) Sth. Aust. |
| 7070-088-26 | Dial reading (1) W.A. - N.T. |
| 7070-088-27 | Dial reading (1) Tas. |
| 7070-088-28 | Dial reading (1) Numerical |

C24P-1

OPERATION OF OUTPUT TRANSISTORS AS MATCHED PAIRS

The type AT1138 transistors are operated in matching pairs, replacements MUST be made accordingly and NOT as single units.

Matched pairs as used in this receiver are identified by a colour dot or stripe or a letter stamped on to the top of the transistor body. Various batch colours or letters are in use. Transistors which have different batch idents. must not be operated together. A matched pair of AT1138 transistors are supplied as:- 2-AT1138 P/No.4128-004-02.

REPLACEMENT OF OUTPUT TRANSISTORS

When refitting or replacing transistors check that the mount positions and faces are clean and free from dust, grit or metal particles.

NOTE: A power transistor replacement hardware package, Part No. 7001-104-01, containing screws, nuts, washers, bushes and mica gaskets is available from Spare Parts Division.

Fit the insulating bushes to the screw holes then fit mica gasket and transistor. Fasten each transistor with 3/8" x 1/8" Whit.screws, lugs, shakeproof washers and 1/8" Whit. nuts. Securely tighten.

OPERATION OF DRIVER TRANSISTORS AS MATCHED PAIRS

The type AT436 transistors are operated in matched pairs, replacements MUST be made accordingly and NOT as single units.

Matched pairs as used in this receiver are identified by a batch number printed on the side of transistor housing. Transistors with different numbers must not be operated together.

A matched pair of AT436 transistors are supplied as :- 2-AT436, Part No. 4128-167-01.

MEASUREMENT AND ADJUSTMENT OF OUTPUT TRANSISTORS COLLECTOR CURRENT

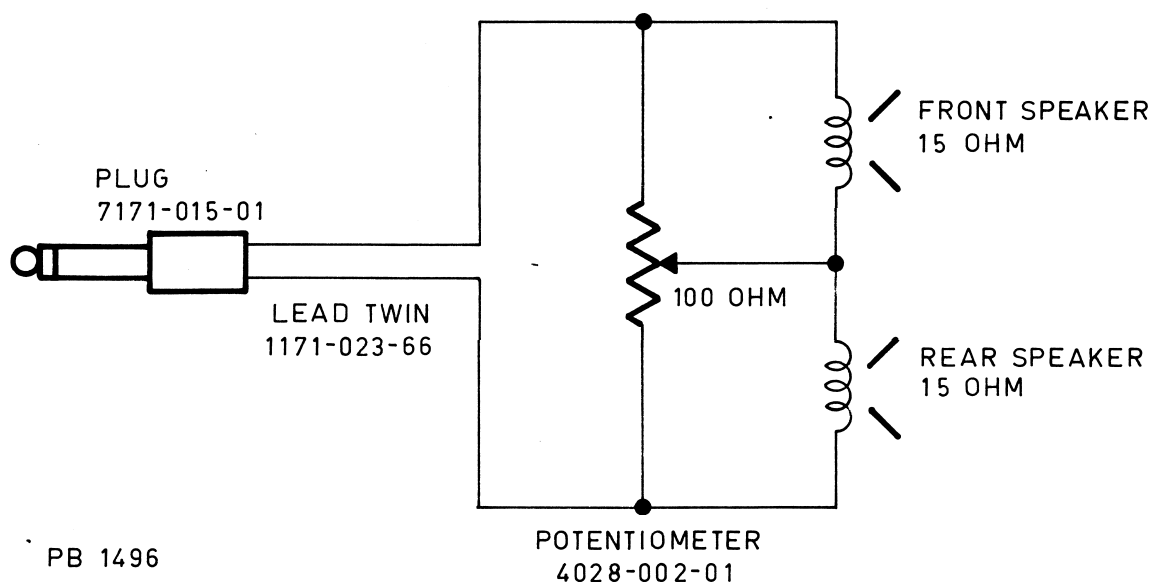
EQUIPMENT Current Meter: 0-1 Amp D.C. terminated with a lead and clip assy.
 Supply Source: 13.0V DC.

CONDITIONS Connect supply leads, negative lead to receiver chassis. Connect speaker to receiver socket adjacent to battery lead entry. Disconnect lead 'D' from pin 'E'. Connect current meter to lead 'D' and pin 'E'. Current meter positive terminal to lead 'D'. No signal applied to aerial socket.

1. Switch receiver "ON" and allow to stabilize for at least five minutes.
2. Adjust the bias potentiometer (Circuit No. 100) to obtain a reading of 150mA.

NOTE:No further adjustment of the bias should be necessary unless the output or driver transistors or associated componentry are replaced.

CONNECTION OF A FADER CONTROL FOR USE WITH FRONT AND REAR SPEAKERS



CAPACITORS

| Circuit No. | Value | Description | Tol ± | Rating V.DCW | Part Number |
|-------------|-----------|-----------------------|----------|-----------------|-------------|
| 1 | 12-120 pF | Trimmer - compression | | | 4000-026-02 |
| 2 | 5-55 pF | Trimmer - compression | | | 4000-001-03 |
| 3 | .0047 uF | Polystyrene | 10% | 50 | 4004-019-07 |
| 4 | 82 pF | Polystyrene | 10% | 100 | 4004-020-01 |
| 5 | 4.7 pF | Ceramic Disc - NPO | .5 pF | 500 | 4008-042-02 |
| 6 | 5 uF | Electrolytic | | 3 | 4005-018-17 |
| 7 | .47 uF | Ceramic disc | | 3 | 4008-059-02 |
| 8 | .047 uF | Ceramic disc | | 25 | 4008-057-03 |
| 9 | 5-55 pF | Trimmer - compression | | | 4000-001-03 |
| 10 | | | | | |
| 11 | 680 pF | Polystyrene | 10% | 100 | 4004-016-02 |
| 12 | 100 pF | Polystyrene | 10% | 100 | 4004-008-06 |
| 13 | .001 uF | Polystyrene | 10% | 50 | 4004-001-09 |
| 14 | .022 uF | Ceramic disc | | 25 | 4008-010-03 |
| 15 | .022 uF | Ceramic disc | | 25 | 4008-010-03 |
| 16 | .047 uF | Polyester | 20% | 160 | 4009-001-25 |
| 17 | 220 pF | Polystyrene | 5% | 100 | 4004-005-03 |
| 18 | 2.7 pF | Ceramic disc - NPO | .25 pF | 500 | 4008-013-01 |
| 19 | 56 pF | Polystyrene | 10% | 100 | 4004-025-02 |
| 20 | | | | | |
| 21 | .0068 uF | Polyester | 20% | 160 | 4009-004-16 |
| 22 | 220 pF | Polystyrene | 5% | 100 | 4004-005-03 |
| 23 | .047 uF | Polyester | 20% | 160 | 4009-001-25 |
| 24 | 5.5-65 pF | Trimmer | | | 4000-057-01 |
| 25 | .047 uF | Polyester | 20% | 160 | 4009-001-25 |
| 26 | .047 uF | Polyester | 20% | 160 | 4009-001-25 |
| 27 | .047 uF | Polyester | 20% | 160 | 4009-001-25 |
| 28 | 220pF | Polystyrene | 5% | 100 | 4004-005-03 |
| 29 | 4 uF | Electrolytic | | 40 | 4005-045-02 |
| 30 | | | | | |
| 31 | 30 uF | Electrolytic | | 12 | 4005-033-08 |
| 32 | .047 uF | Polyester | 20% | 160 | 4009-001-25 |
| 33 | .1 uF | Polyester | 20% | 160 | 4009-008-31 |
| 34 | .047 uF | Polyester | 20% | 160 | 4009-001-25 |
| 35 | .047 uF | Polyester | 20% | 160 | 4009-001-25 |
| 36 | 220 pF | Polystyrene | 5% | 100 | 4004-005-03 |
| 37 | .0022 uF | Polyester | 20% | 400 | 4009-002-14 |
| 38 | .0022 uF | Polyester | 20% | 400 | 4009-002-14 |
| 39 | .0068 uF | Polyester | 10% | 270 | 4009-004-07 |
| 40 | | | | | |
| 41 | .1 uF | Ceramic disc | | 25 | 4008-004-04 |
| 42 | .033 uF | Polyester | 10% | 160 | 4009-019-08 |
| 43 | .33 uF | Polyester | 10% | 160 | 4009-005-14 |
| 44 | .001 uF | Ceramic feed thru | | | 4008-040-08 |
| 45 | | | | | |
| 46 | .047 uF | Polyester | 10% | 160 | 4009-001-15 |
| 47 | .47 uF | Ceramic disc | | 3 | 4008-059-02 |
| 48 | 10 uF | Electrolytic | | 16 | 4005-007-22 |
| 49 | 100 pF | Polystyrene | 10% | 100 | 4004-008-06 |
| 50 | 30 uF | Electrolytic | | 12 | 4005-033-08 |
| 51 | 5 uF | Electrolytic | | 12 | 4005-018-15 |
| 52 | .1 uF | Polyester | 10% | 160 | 4009-008-20 |
| 53 | .1 uF | Polyester | 10% | 160 | 4009-008-20 |
| 54 | 640 uF | Electrolytic | | 16 | 4005-046-04 |
| 55 | .047 uF | Ceramic disc | | 25 | 4008-057-04 |
| 56 | .047 uF | Ceramic disc | | 25 | 4008-057-04 |
| 57 | .001 uF | Ceramic feed thru | | | 4008-040-08 |
| 58 | .0068 uF | Polyester | 10% | 270 | 4009-004-07 |
| 59 | 100 pF | Polystyrene | 10% | 100 | 4004-008-06 |

RESISTORS

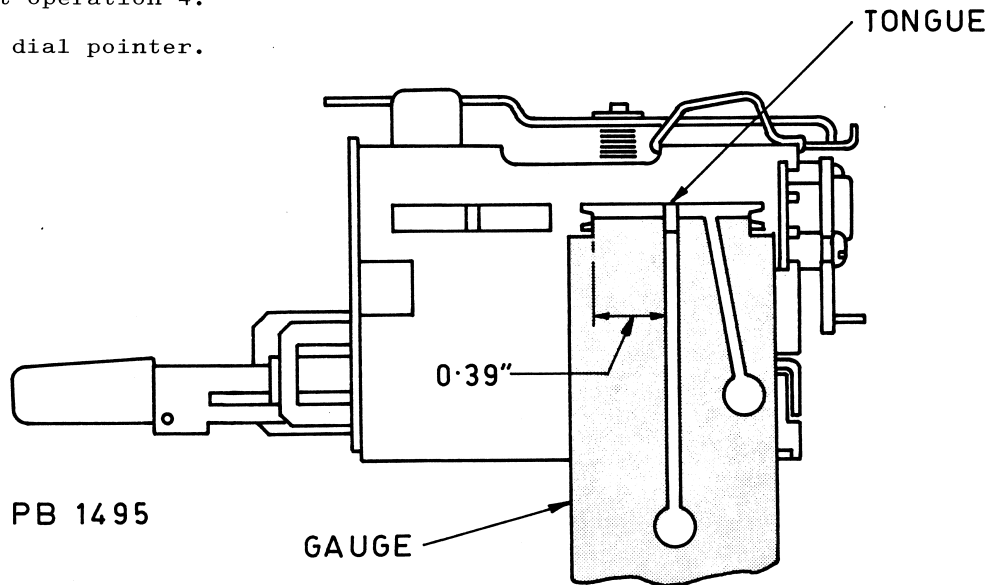
| Circuit No. | Value Ohms | Description | Tol + - | Rating Watts | Part Number |
|----------------|---------------|--------------------------------|---------------|-----------------|-------------|
| 60 | | | | | |
| 61 | 1K | Carbon | 10% | .5 | 4022-008-01 |
| 62 | 150K | Carbon | 10% | .5 | 4022-038-01 |
| 63 | 220 | Carbon | 10% | .5 | 4022-017-01 |
| 64 | 4.7K | Carbon | 10% | .5 | 4022-005-01 |
| 65 | 560 | Carbon | 10% | .5 | 4022-010-01 |
| 66 | 1K | Carbon | 10% | .5 | 4022-008-01 |
| 67 | 2.7K | Carbon | 10% | .5 | 4022-043-01 |
| 68 | 220K | Carbon | 10% | .5 | 4022-063-01 |
| 69 | 1K | Carbon | 10% | .5 | 4022-008-01 |
| 70 | 4.7K | Carbon | 10% | .5 | 4022-005-01 |
| 71 | 8.2K | Carbon | 10% | .5 | 4022-027-02 |
| 72 | 5.6K | Carbon | 10% | .5 | 4022-022-02 |
| 73 | 10K | Carbon | 10% | .5 | 4022-004-01 |
| 74 | 1.5K | Carbon | 10% | .5 | 4022-007-01 |
| 75 | 150K | Carbon | 10% | .5 | 4022-038-01 |
| 76 | 47K | Carbon | 10% | .5 | 4022-051-03 |
| 77 | 220K | Carbon | 10% | .5 | 4022-063-01 |
| 78 | 22 | Carbon | 10% | .5 | 4022-033-01 |
| 79 | 1K | Carbon | 10% | .5 | 4022-008-01 |
| 80 | 6.8K | Carbon | 10% | .5 | 4022-002-02 |
| 81 | 1.5K | Carbon | 10% | .5 | 4022-007-01 |
| 82 | 68K | Carbon | 10% | .5 | 4022-048-01 |
| 83 | 10K | Carbon | 10% | .5 | 4022-004-01 |
| 84 | 4.7K | Carbon | 10% | .5 | 4022-005-01 |
| 85 | 15 | Carbon | 10% | .5 | 4022-053-01 |
| 86 | 390 | Carbon | 10% | .5 | 4022-058-04 |
| 87 | 100 | Carbon | 10% | .5 | 4022-062-01 |
| 88 | 1K | Carbon | 10% | .5 | 4022-008-01 |
| 89 | 4.7K | Carbon | 10% | .5 | 4022-005-01 |
| 90 | 680 | Carbon | 10% | .5 | 4022-028-02 |
| 91 | 4.7K | Carbon | 10% | .5 | 4022-005-01 |
| 92 | 47 | Carbon | 10% | .5 | 4022-041-01 |
| 93 | 12K | Carbon | 10% | .5 | 4022-029-01 |
| 94 | 4.7K | Carbon | 10% | .5 | 4022-005-01 |
| 95 | 1K | Carbon | 10% | .5 | 4022-008-01 |
| 96 | | Volume and Tone Controls | | | |
| | | Concentric shaft potentiometer | | | |
| | | front section 50K ohm | | | |
| | | Rear section 50K ohm tapped | | | |
| | | at 20K ohm S.P.S.T. push-push | | | |
| | | switch attached | | | 4030-030-13 |
| 97 | 15K | Carbon | 10% | .5 | 4022-001-02 |
| 98 | 100K | Carbon | 10% | .5 | 4022-013-02 |
| 99 | 100K | Carbon | 10% | .5 | 4022-013-02 |
| 100 | 220 | Potentiometer - preset | 20% | | 4025-034-02 |
| 101 | 2.2K | Carbon | 10% | .5 | 4022-021-02 |
| 102 | 1K | Carbon | 10% | .5 | 4022-008-01 |
| 103 | 4.7K | Carbon | 10% | .5 | 4022-005-01 |
| 104 | 68 | Carbon | 10% | .5 | 4022-024-01 |
| 105 | 1K | Carbon | 10% | .5 | 4022-008-01 |
| 106 | 15K | Carbon | 10% | .5 | 4022-001-02 |
| 107 | 150 | Carbon | 10% | .5 | 4022-052-01 |
| 108 | 220 | Carbon | 10% | .5 | 4022-017-01 |
| 109 | 47 | Carbon | 10% | .5 | 4022-041-01 |
| 110 | 68 | Carbon | 10% | .5 | 4022-024-01 |
| 111 | 47 | Carbon | 10% | .5 | 4022-041-01 |
| 112 | .27 | Wire wound | 10% | .5 | 4024-007-02 |
| 113 | .27 | Wire wound | 10% | .5 | 4024-007-02 |
| 114 | 47 | Carbon | 10% | 1 | 4022-041-03 |
| 115 | | | | | |
| 116 | | | | | |
| 117 | | | | | |
| 118 | | | | | |
| 119 | | | | | |

BROADCAST ALIGNMENT

When iron cores or tuning unit coil assy. have been replaced or if station logging is outside limits.

| Oper. No. | Generator Connection | Generator Frequency | Instructions |
|---|---|---------------------|---|
| 1 | Connect IF attenuator to test pins "B" and "C" (resistor to pin "C") | | |
| 2 | Turn perm. tuner against high frequency end of travel stop. Set all iron cores so that no less than 1/8" of shaft protrudes out through front panel of receiver. | | |
| 3 | To aerial Lead-in Socket 65 pF dummy aerial in series | 1625 KHz | Adjust Osc. RF and both aerial trimmer capacitors for maximum output. |
| 4 | <u>PUSH BUTTON RECEIVER:</u> Partly push in one of the push button knobs to release clutch before inserting gauge. <u>MANUAL RECEIVER:</u> Disengage clutch at crown wheel by utilizing clutch Release Bracket, before inserting gauge. In the side of tuning unit, opposite end to tuning spindle there are two slots; place the notched blade of gauge into the slot nearest rear of tuner. The 0.39" section of gauge is to be against the projection at front edge of slot. Spring fingers of gauge are to be at rear of tongue. Refer diagram. | | |
| <u>NOTE:</u> Do not strain or tilt core carriage. | | | |
| | As oper. 3 | 1000 KHz | With tuner set in position detailed, adjust Osc., RF and both Aerial iron cores for maximum output. |
| 5 | As Oper. 3 | 600 KHz | Rock tuning control through signal, adjust Osc. shunt coil for maximum output. |
| 6 | Turn tuning control to low frequency end of travel (iron cores full in.) Tune signal generator to receiver. The low frequency tuning limit should be between 510 and 528 KHz. | | |
| 7 | Repeat operation 4. | | |
| 8 | Align dial pointer. | | |

TONGUE



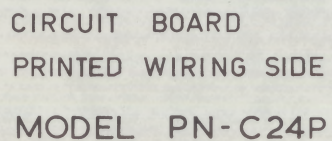
SETTING OF DIAL POINTER

Disconnect the IF attenuator.
Disconnect the generator cable from dummy aerial then connect 20 ft., of aerial wire to the dummy aerial terminal.
Accurately tune the receiver to a station marked on the dial near 1000 KHz.
Using a screwdriver, adjust by bending the pointer carriage arm so that the pointer coincides with the centre of the tuned station call sign.

Check dial logging and if necessary readjust pointer carriage arm.

MISCELLANEOUS

| Circuit No. | Description | Part Number |
|----------------|---|-------------|
| 120 | | |
| 121 | Choke - 6.8 uH | 4048-032-01 |
| 122 | Permeability Tuner Unit - complete | |
| | PUSH BUTTON | 4050-047-05 |
| | This tuner consists of the following : | |
| | Iron Sleeve (3) | 4065-037-01 |
| | Iron Sleeve (1) oscillator | 4065-038-01 |
| | Iron core (4) | 4065-039-02 |
| | Coil assy. | 4036-053-01 |
| | includes: | |
| | Aerial coil | 4036-057-01 |
| | Aerial transformer | 4043-033-01 |
| | R.F. coil | 4036-057-01 |
| | Oscillator transformer | 4043-033-01 |
| 123 | No. 1 I.F. Transformer - yellow/black | 4044-032-01 |
| 124 | No. 2 I.F. Transformer - yellow/green | 4044-032-02 |
| 125 | Oscillator shunt coil | 4036-044-02 |
| 126 | No. 3 I.F. Transformer - yellow/blue | 4044-032-03 |
| 127 | No. 4 I.F. Transformer - yellow/violet | 4044-032-04 |
| 128 | | |
| 129 | Choke - iron core | 4048-025-05 |
| 130 | Driver transformer | 4042-125-01 |
| 131 | Speaker transformer | 4042-128-01 |
| 132 | Choke - speaker filter | 4048-043-02 |
| 133 | Speaker - type C96L36/69/15 | 4056-004-18 |
| 134 | | |
| 135 | | |
| 136 | Transistor - Type AT320 - R.F. amp | 4128-199-01 |
| 137 | Transistor - Type AT321 - Mixer | 4128-119-01 |
| 138 | Transistor - Type AT321 - Oscillator | 4128-119-01 |
| 139 | Transistor - Type AT321 - I.F. amp | 4128-119-01 |
| 140 | Transistor - Type BF184 - I.F. amp | 4128-178-01 |
| 141 | Transistor - Type AT330 - Voltage Regulator | 4128-168-01 |
| 142 | Transistor - Type AT337 - Audio amp | 4128-133-01 |
| 143 | Transistor - Type AT337 - Audio amp | 4128-133-01 |
| 144 | Transistor - Type 2 - AT436 Matched pair - Audio Driver | 4128-167-01 |
| 145 | Transistor - Type AC125 - Temperature compensation | 4128-039-01 |
| 146 | Transistor - Type 2 - AT1138 Matched pair - Audio Output | 4128-004-02 |
| 147 | Diode - Type 1N60A - Detector | 4127-032-01 |
| 148 | Plug - Speaker lead | 7171-015-01 |
| 149 | Aerial socket | 7222-037-01 |
| 150 | Noise suppression switch | 4059-187-01 |
| 151 | Indicator and dial lamp | 4068-003-04 |
| 152 | Indicator and dial lamp | 4068-003-04 |
| 153 | Noise suppressor indicator lamp | 4068-003-04 |
| 154 | Fuse - 3 Amp | 4071-010-02 |
| 155 | Speaker Socket | 7222-033-11 |
| 156 | ON/OFF switch - part of volume control | |

PB1675

